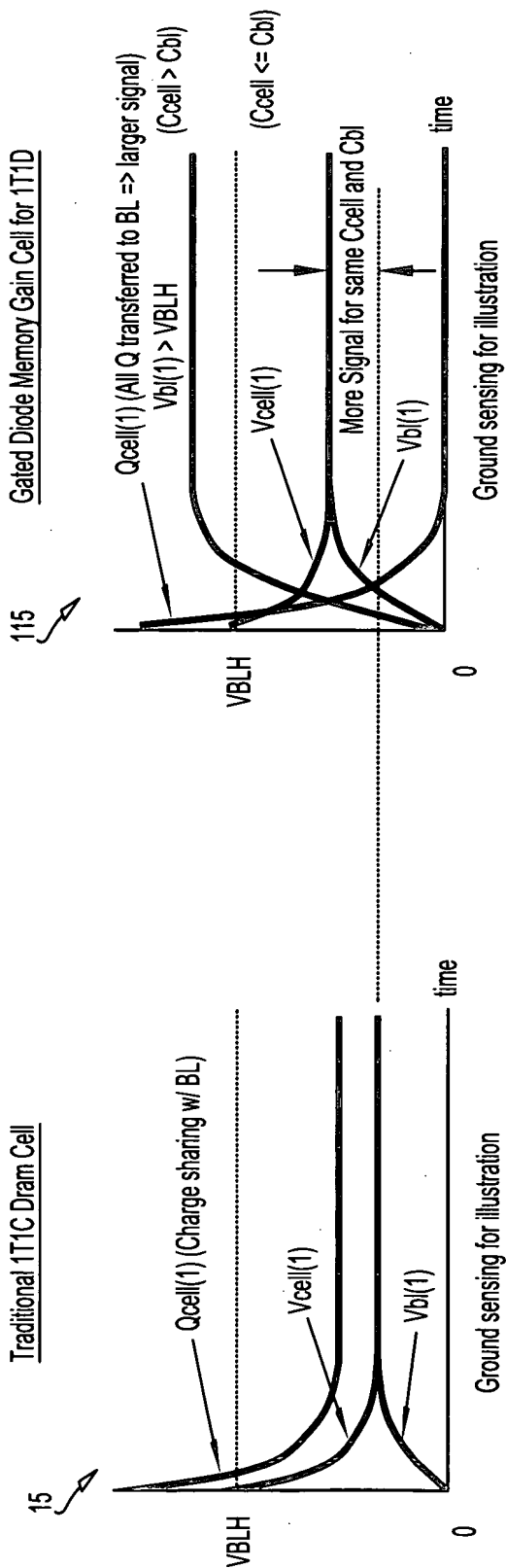


Traditional 1T1C Dram Cell



FLA

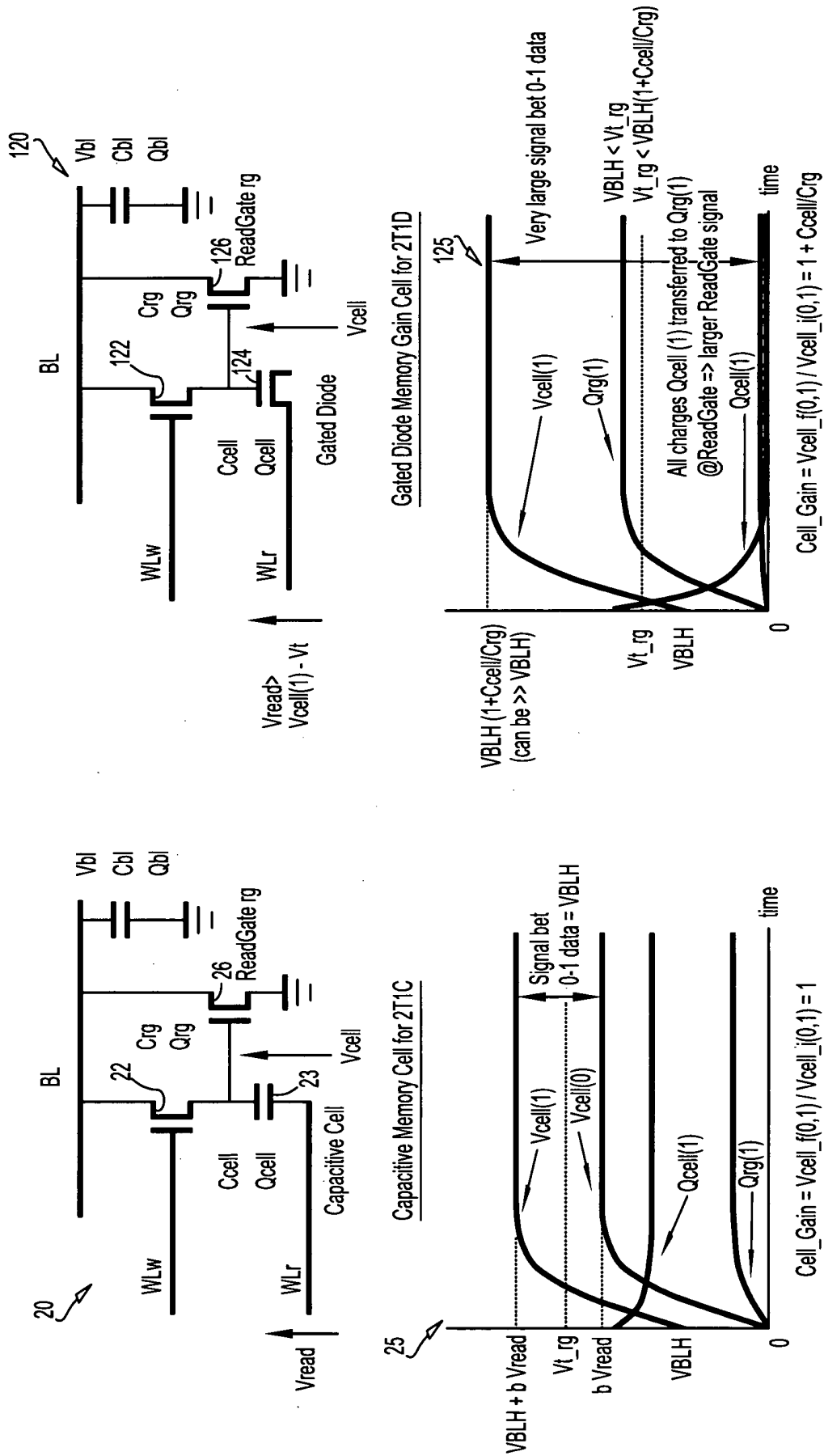
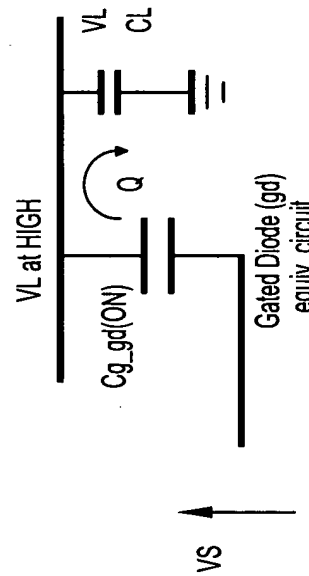
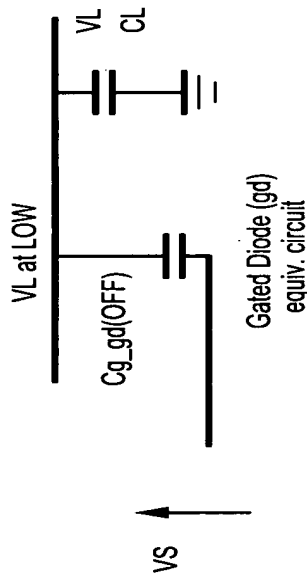
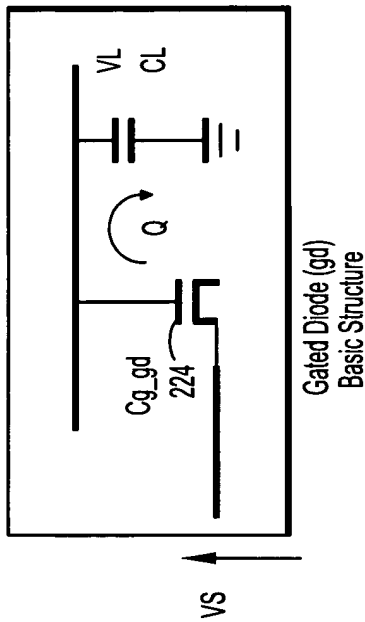


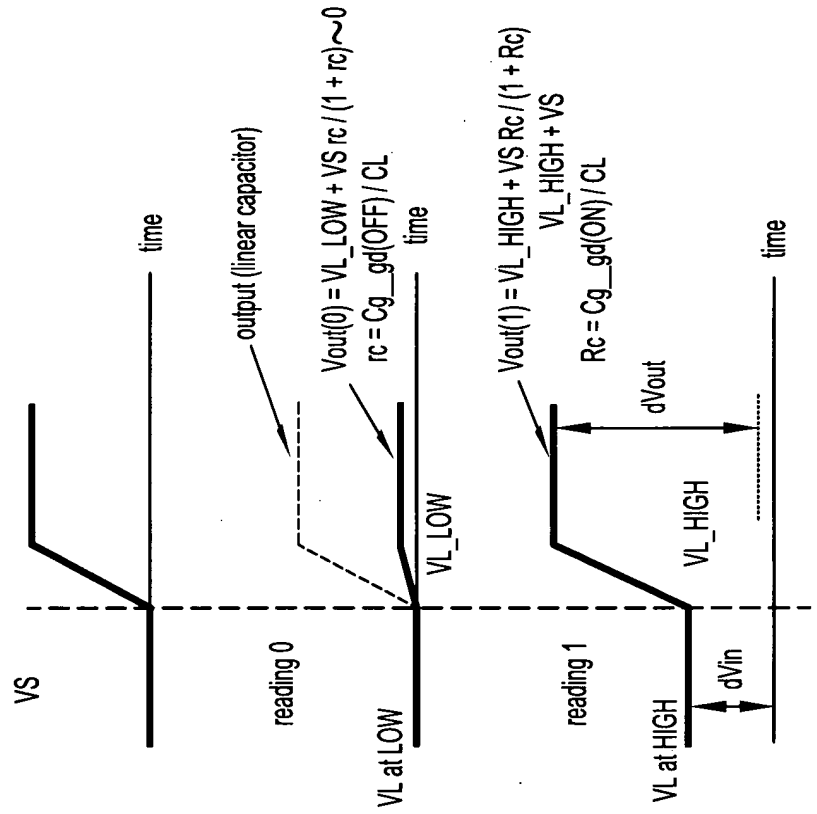
FIG. 1B



$Cg_gd(ON) \gg CL \gg Cg_gd(OFF)$
Typically, $Cg_gd(OFF) : CL : Cg_gd(ON) = 1 : 10 : 100$

200

FIG. 2A



210

$$R_c = C_{g_gd} / C_{g_rg}$$

$$\text{Gain} = V_{g_f} / V_{g_i}$$

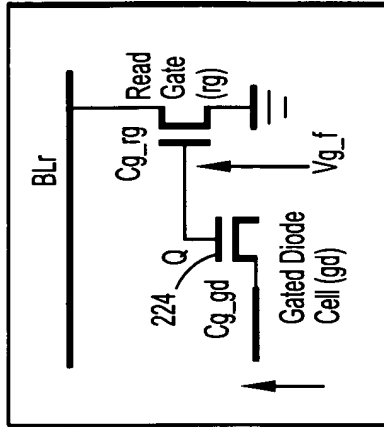
$$\text{Gain} = 1 + R_c - (V_{t_gd} / V_{g_i}) R_c \sim 1 + R_c$$

$$\text{Gain} = (1 + V_s / V_{g_i}) R_c / (1 + R_c)$$

$$V_{g_i} = 0.4 \text{ V}, V_{t_gd} = 0$$

C_{g_gd} / C_{g_rg}	0.01	0.1	1	2	5	10	100	
$1 + R_c$	1.01	1.1	2	3	6	11	101	
$R_c / (1 + R_c)$	0.01	0.09	0.5	0.67	0.83	0.91	0.99	
Gain	0.35	0.32	1.75	2.35	2.91	3.19	3.47	$V_s / V_{g_i} = 2.5$
Gain	0.04	0.36	2.00	2.68	3.32	3.64	3.96	$V_s / V_{g_i} = 3$
Charge Transfer	<---	complete	---	<---	constrained	---	---	

typical operating point



@ Typical operating point
-700 mV overdrive for Read Gate
($V_{t_rg} = 0.6 \text{ V}$)
-10 - 20 x Q_{min} charge reserved in
Gate Diode for SER protection
 $C_{g_rg} = 0.2 \text{ fF}$, $C_{g_gd} = 2 + \text{fF}$

$$\text{Gain} = V_{g_f} / V_{g_i}$$

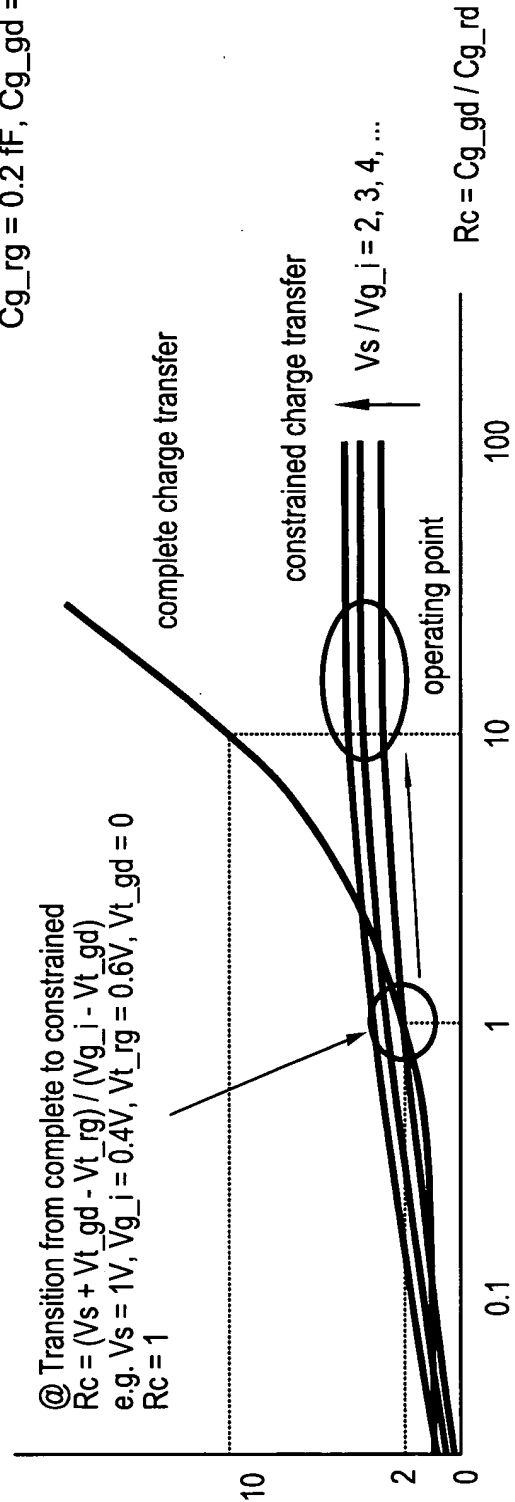


FIG. 2B

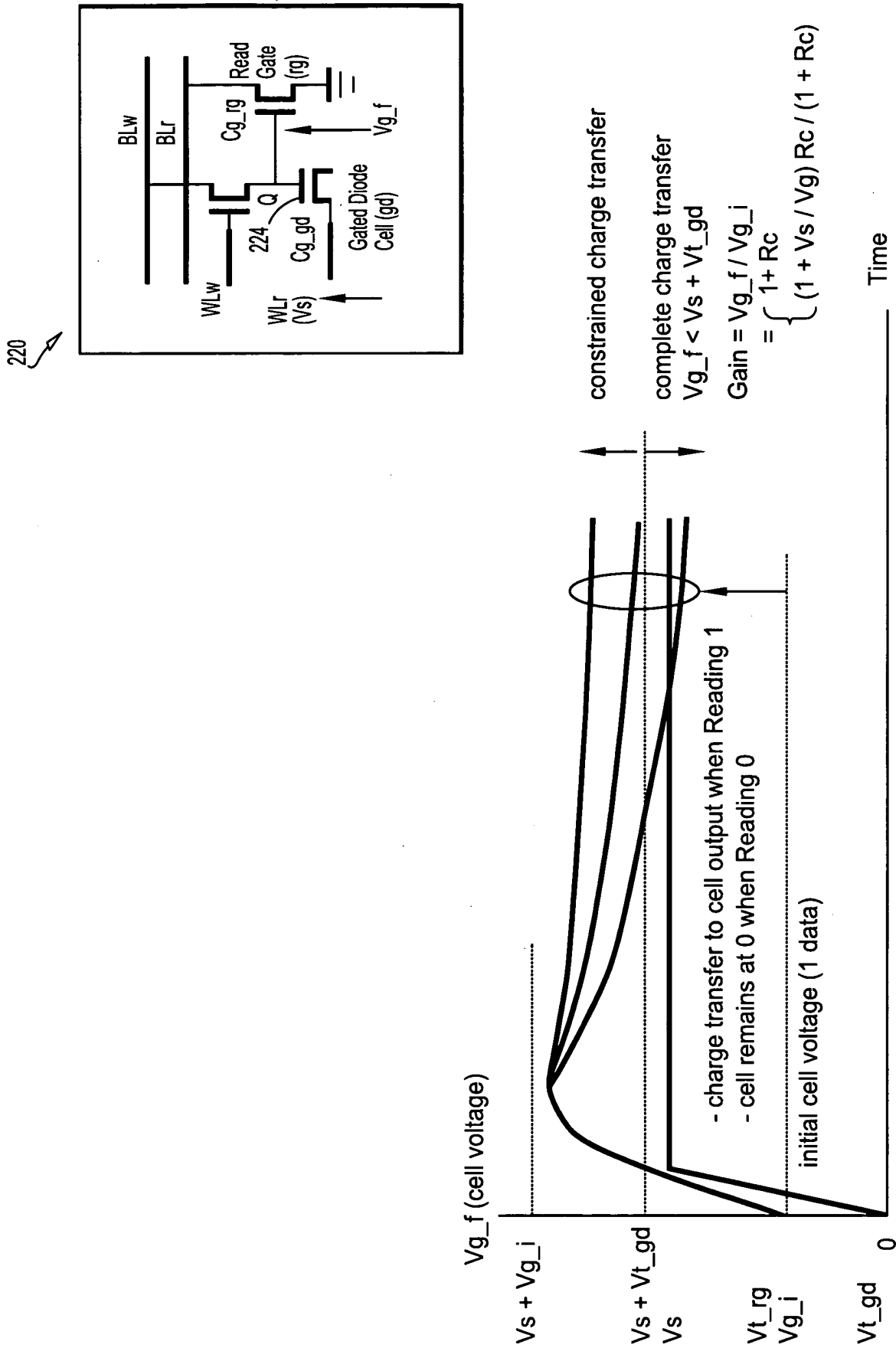


FIG. 2C

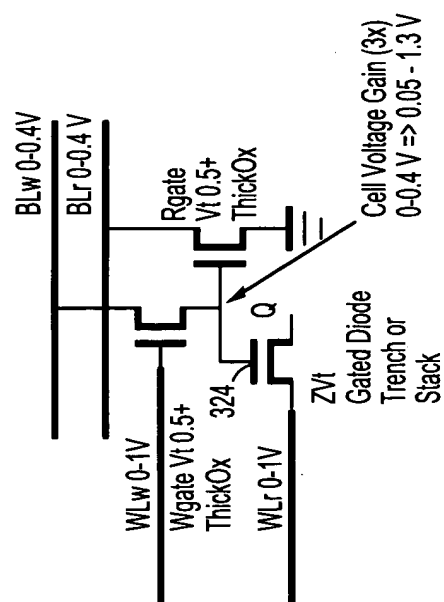
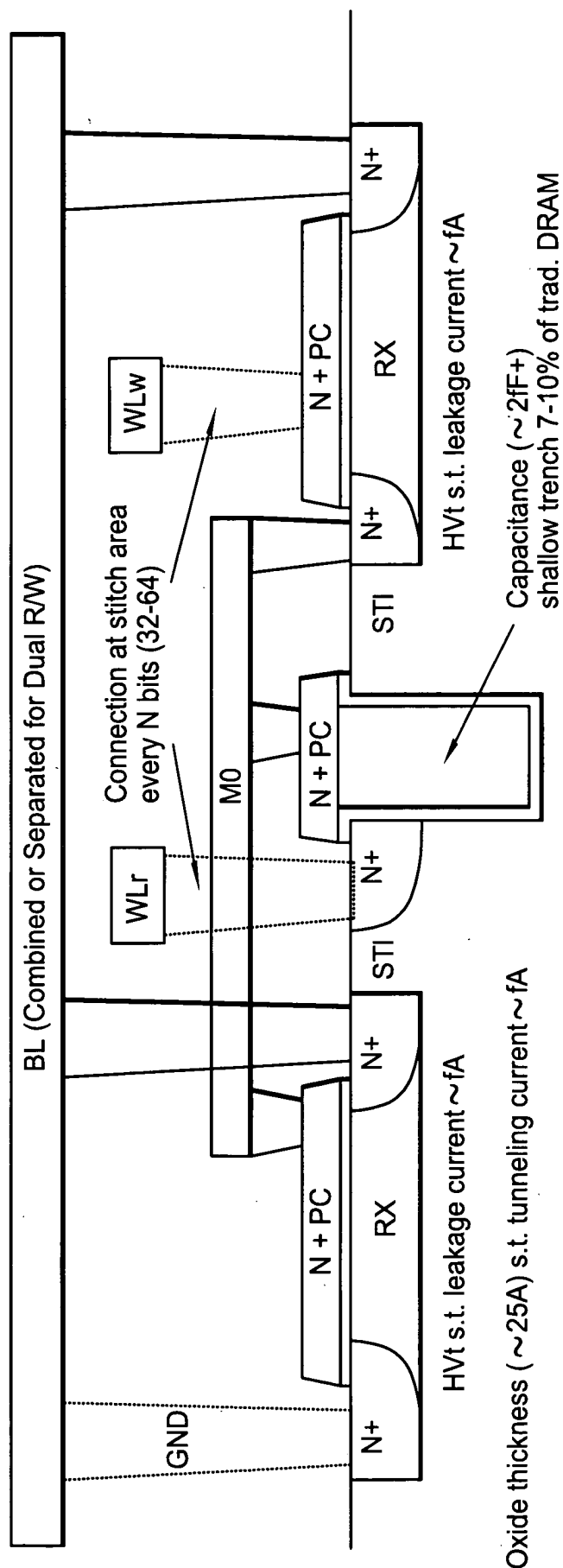


FIG. 3A



FIG. 3B

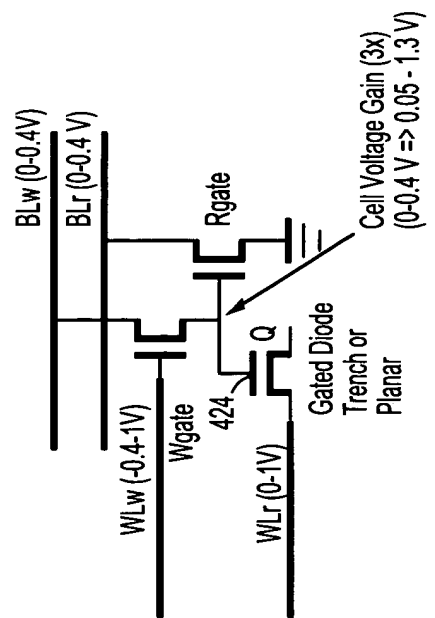
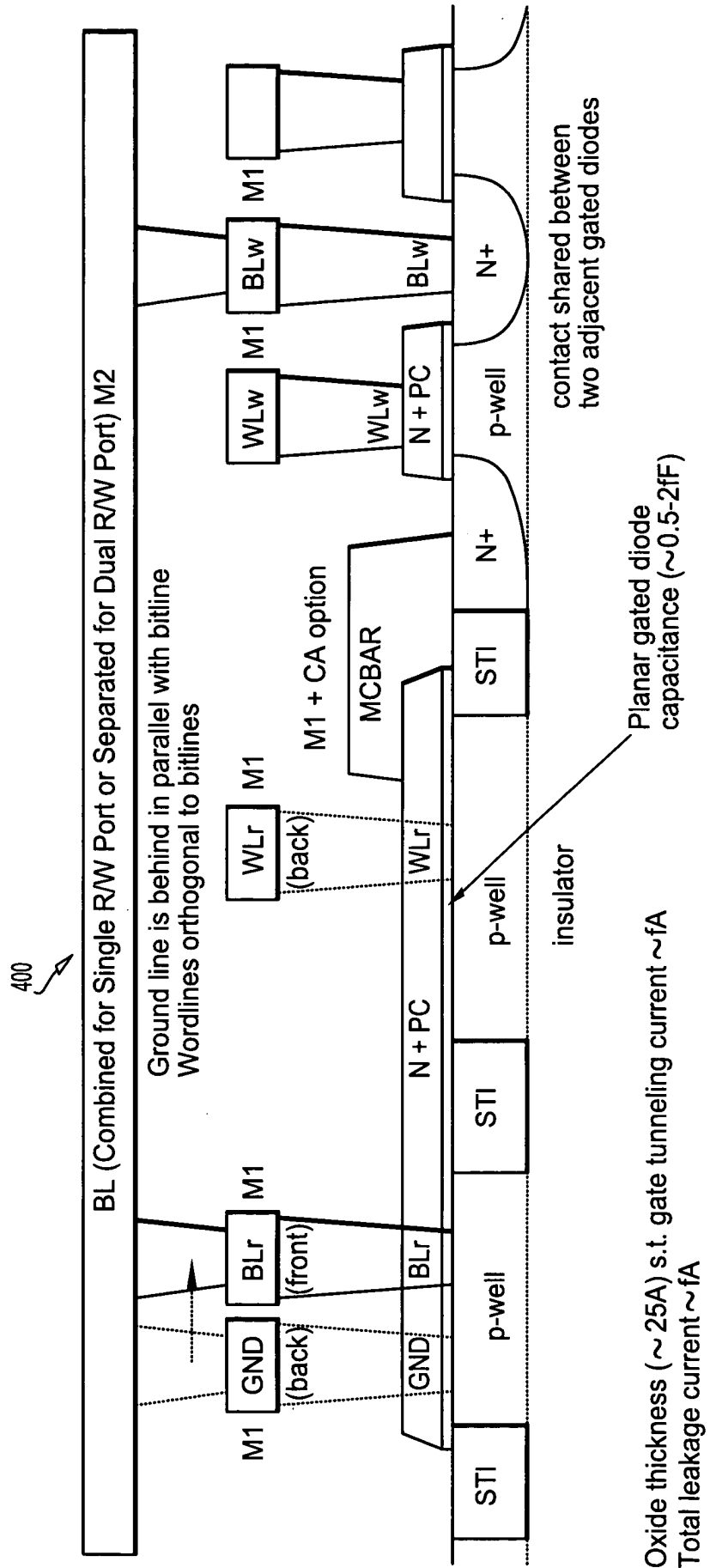


FIG. 4

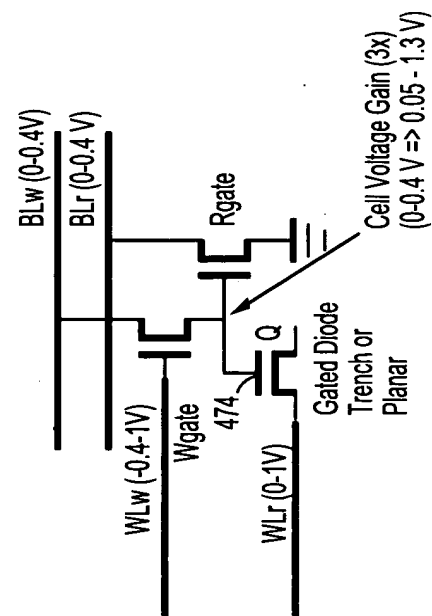
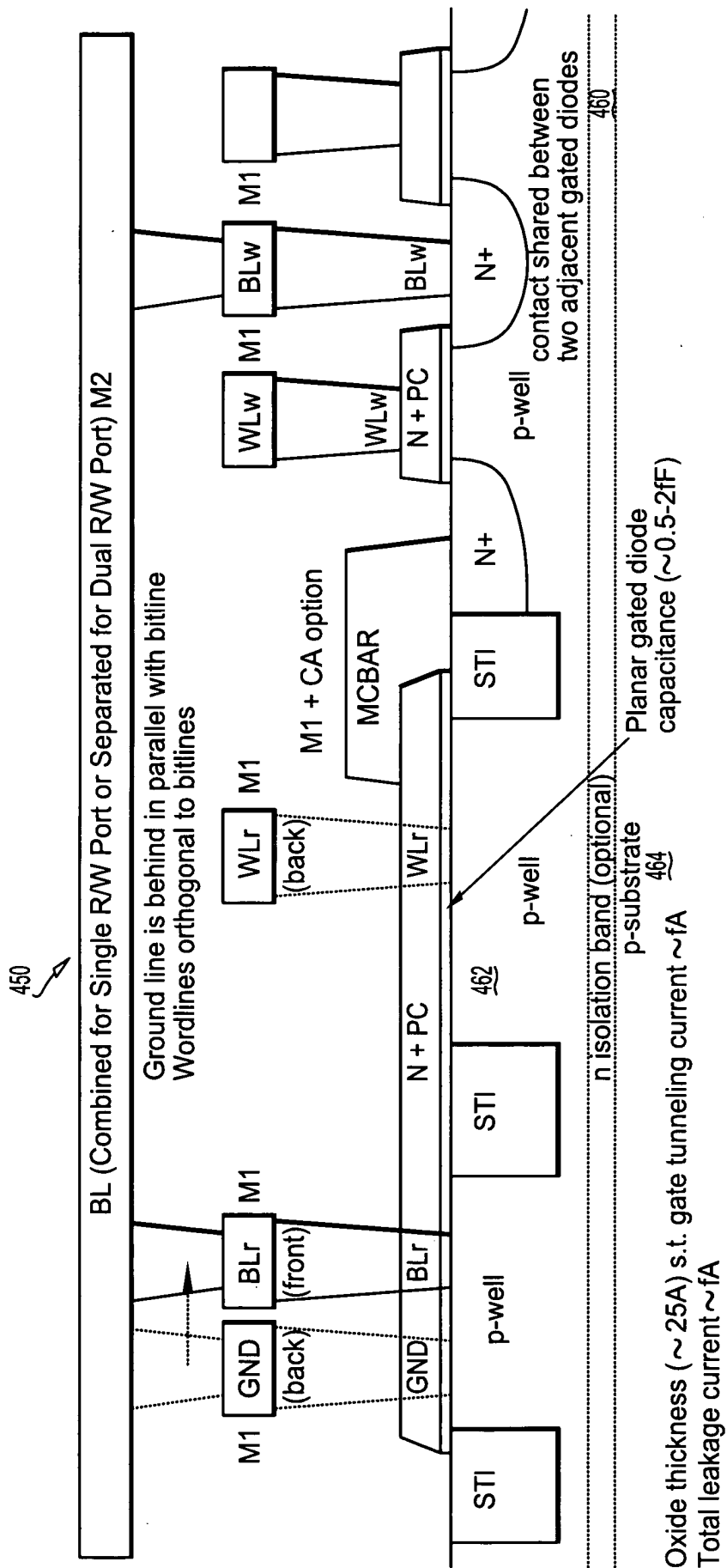


FIG. 5

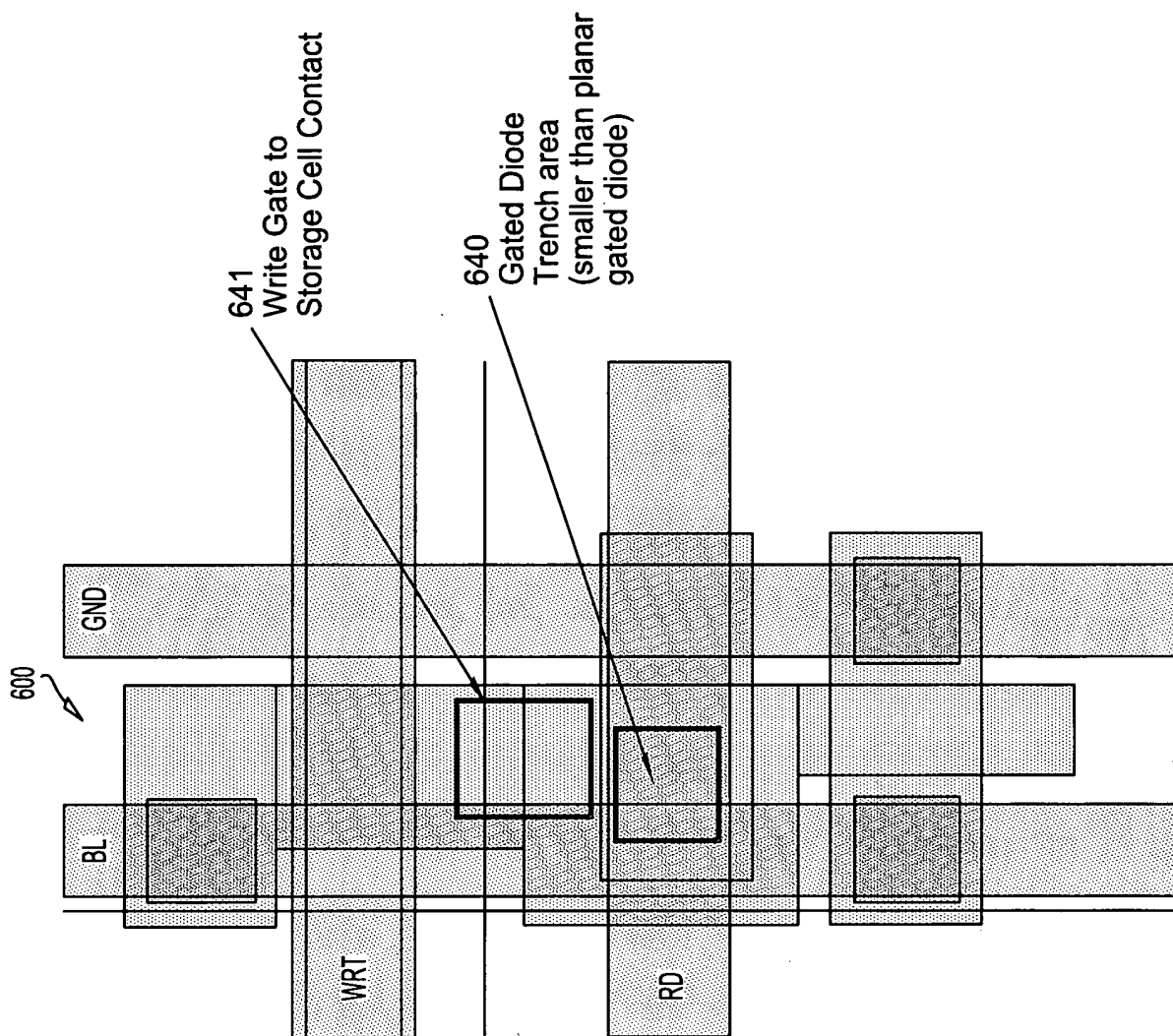


FIG. 6

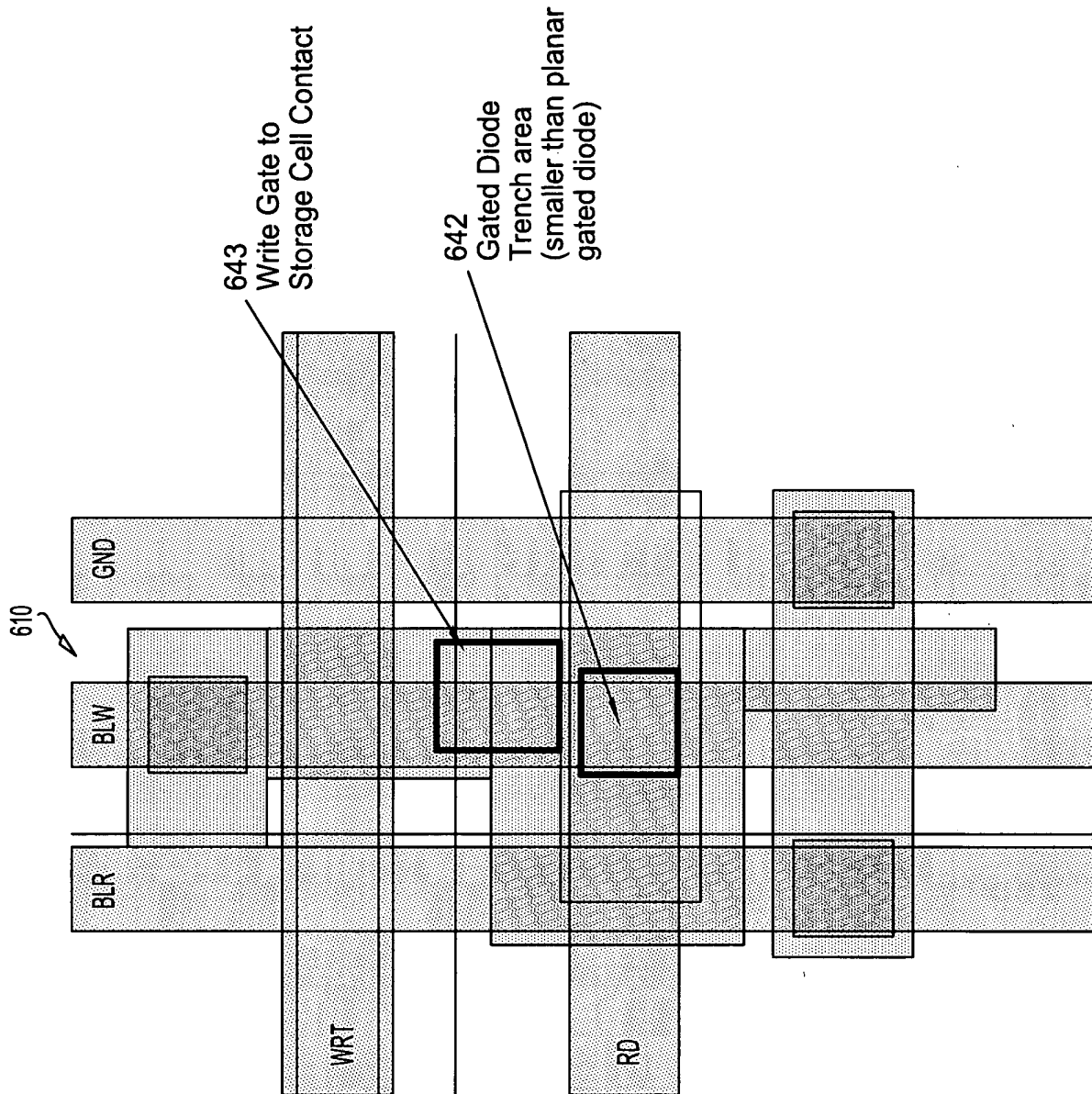


FIG. 7

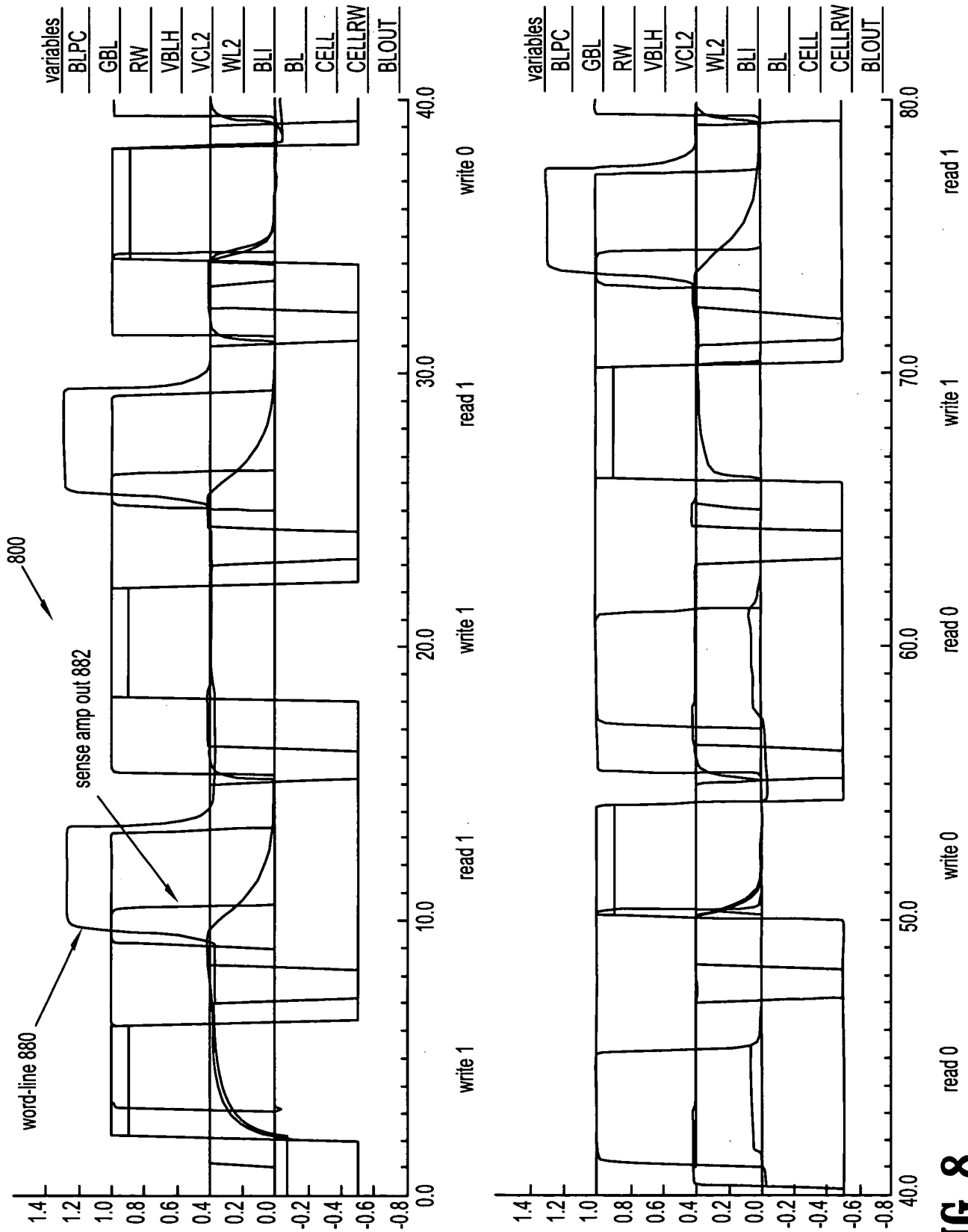
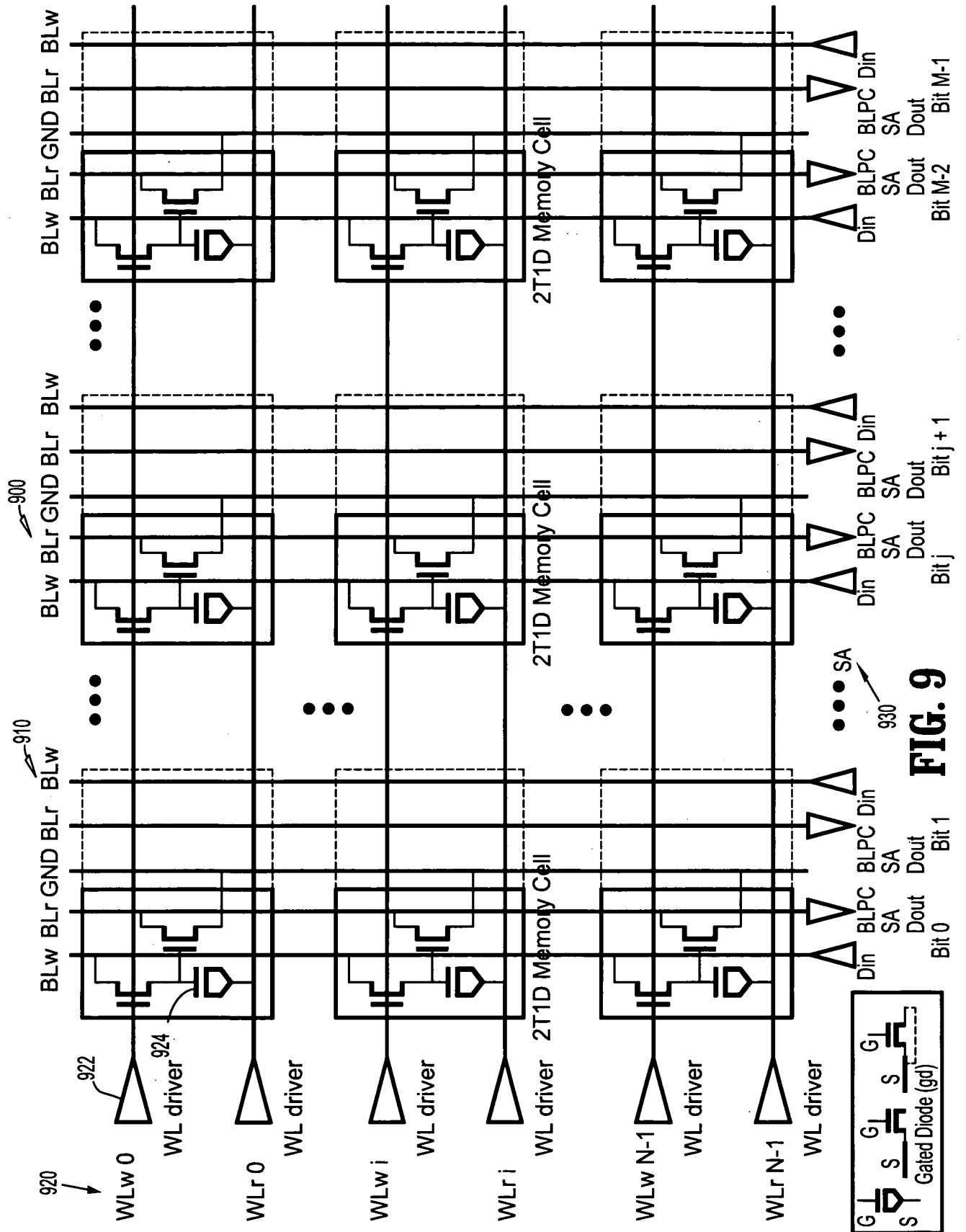
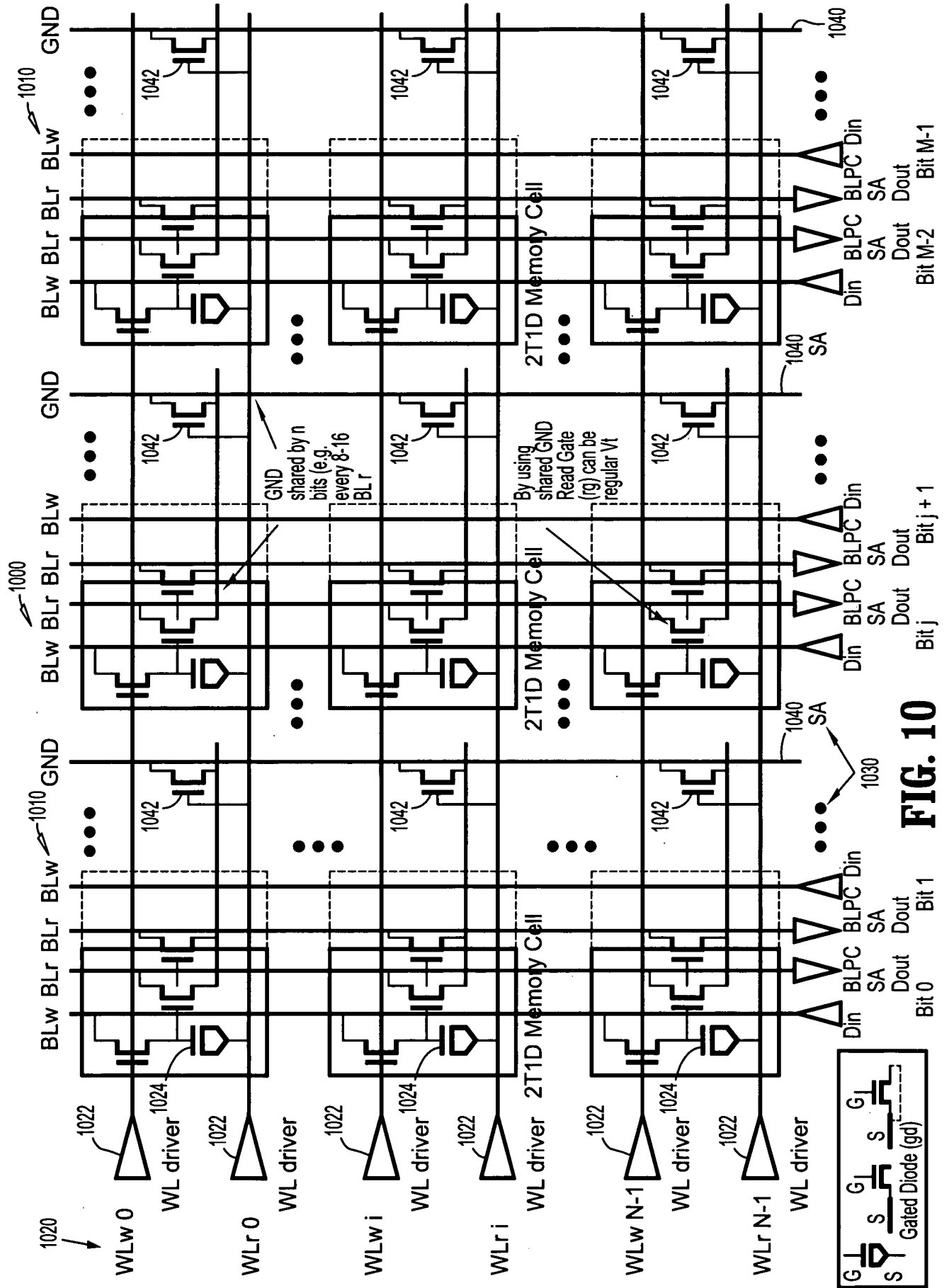


FIG. 8





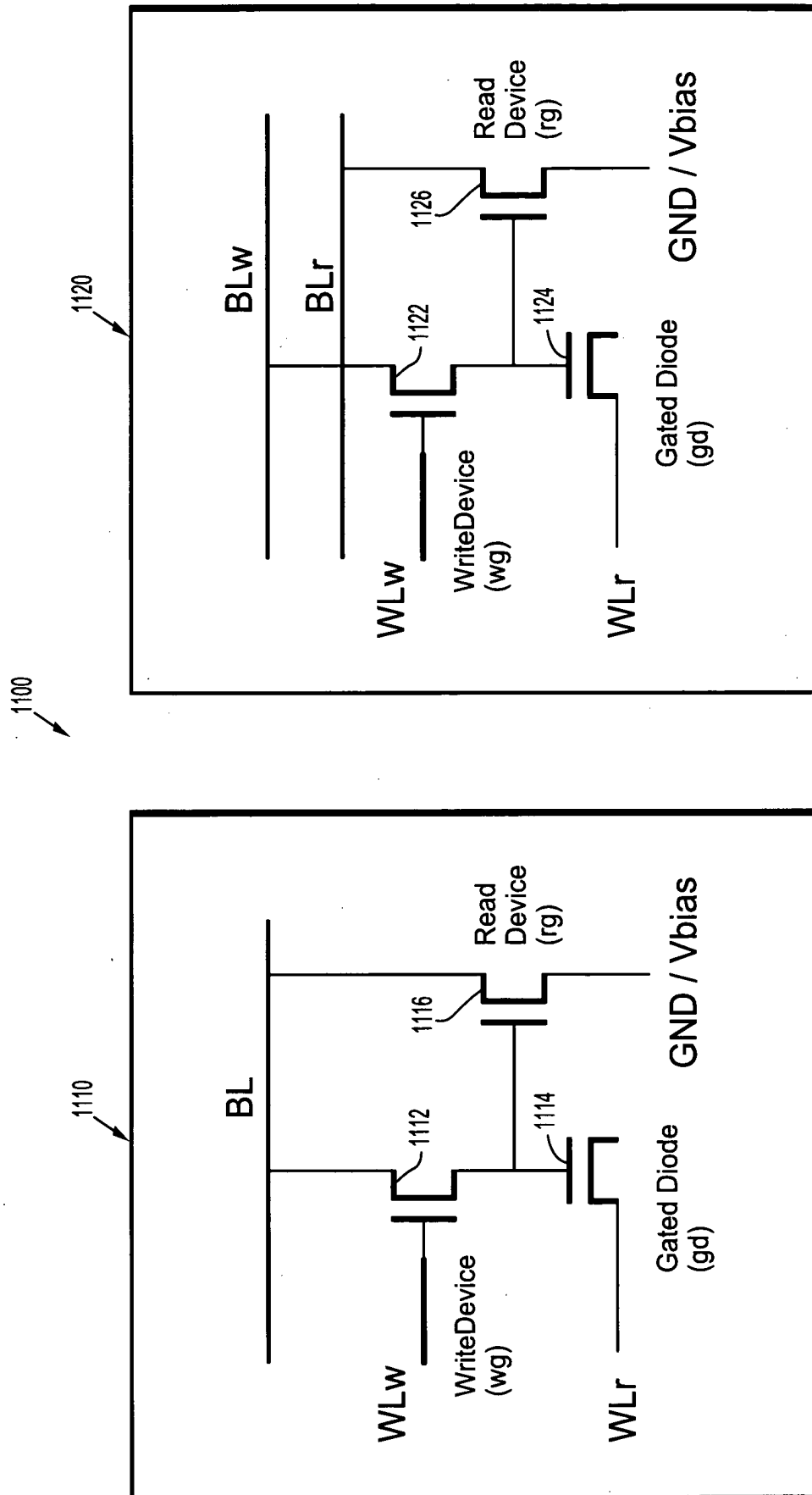


FIG. 11A



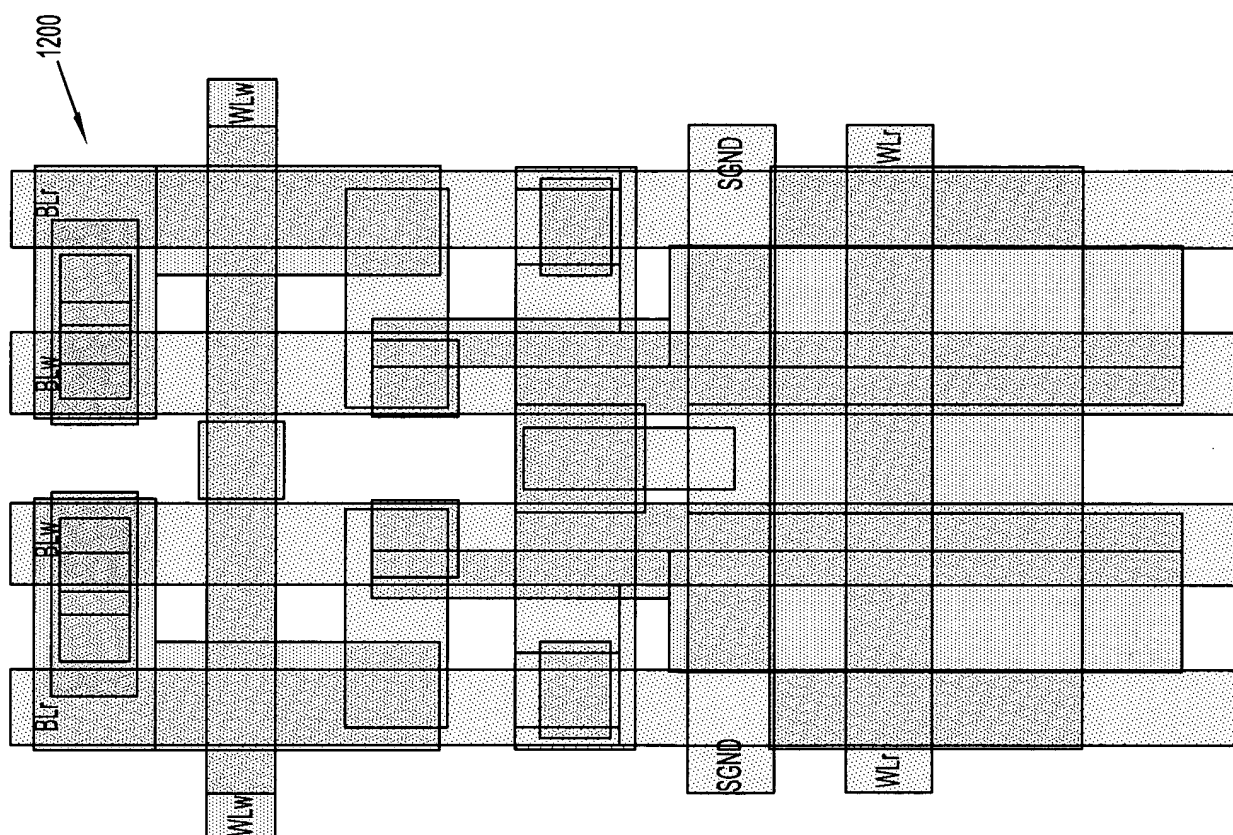


FIG. 12

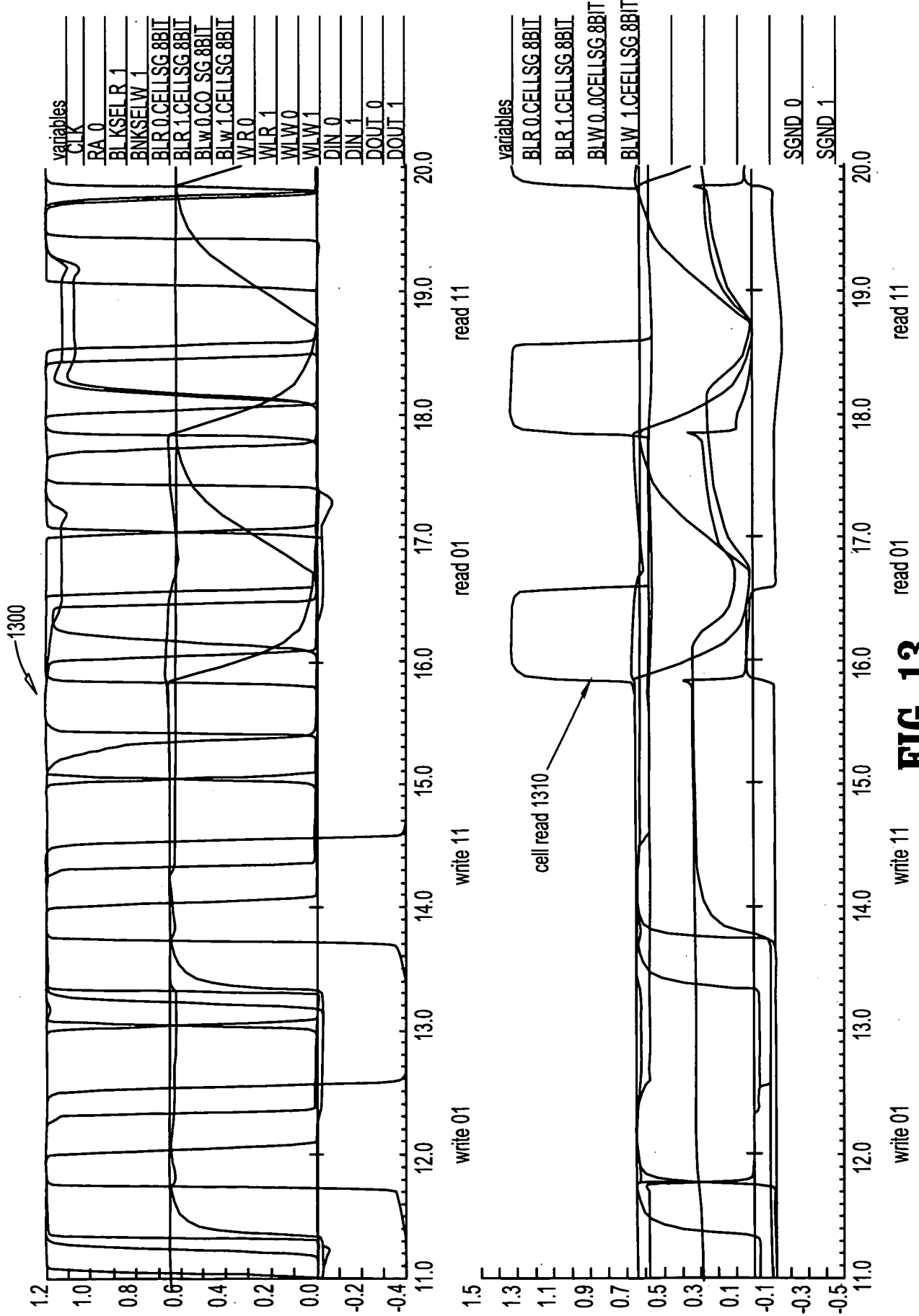


FIG. 13

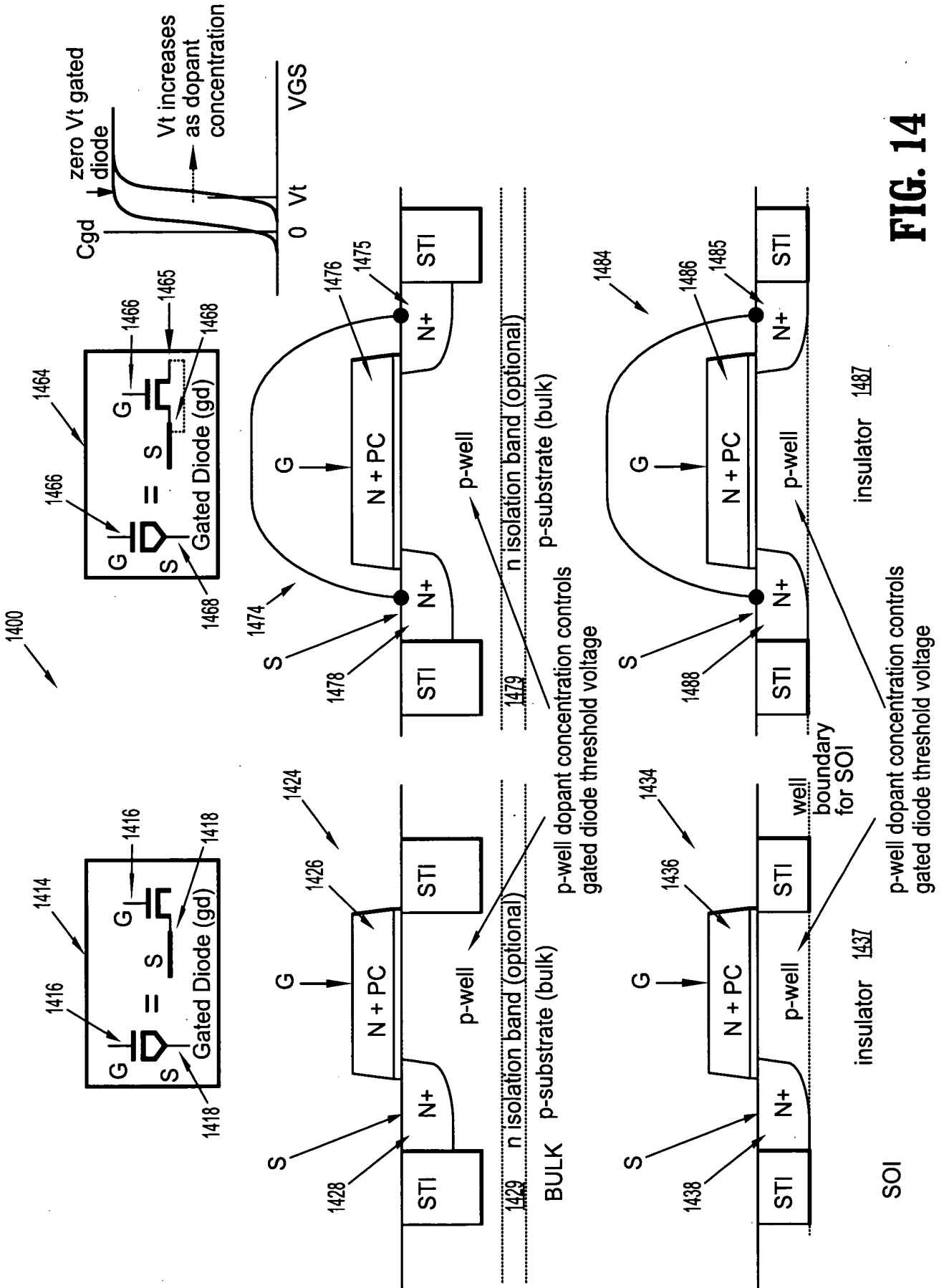


FIG. 14

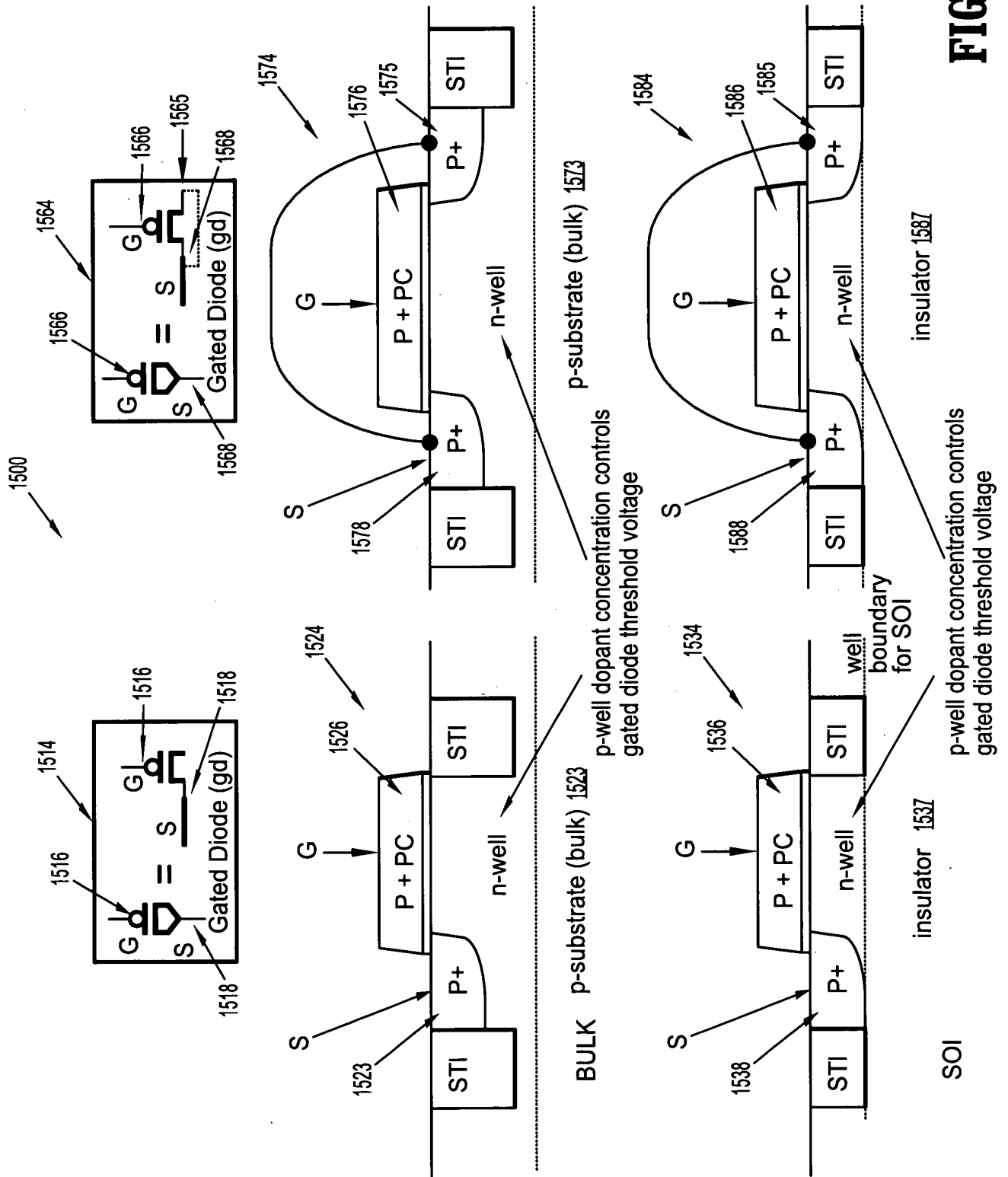


FIG. 15

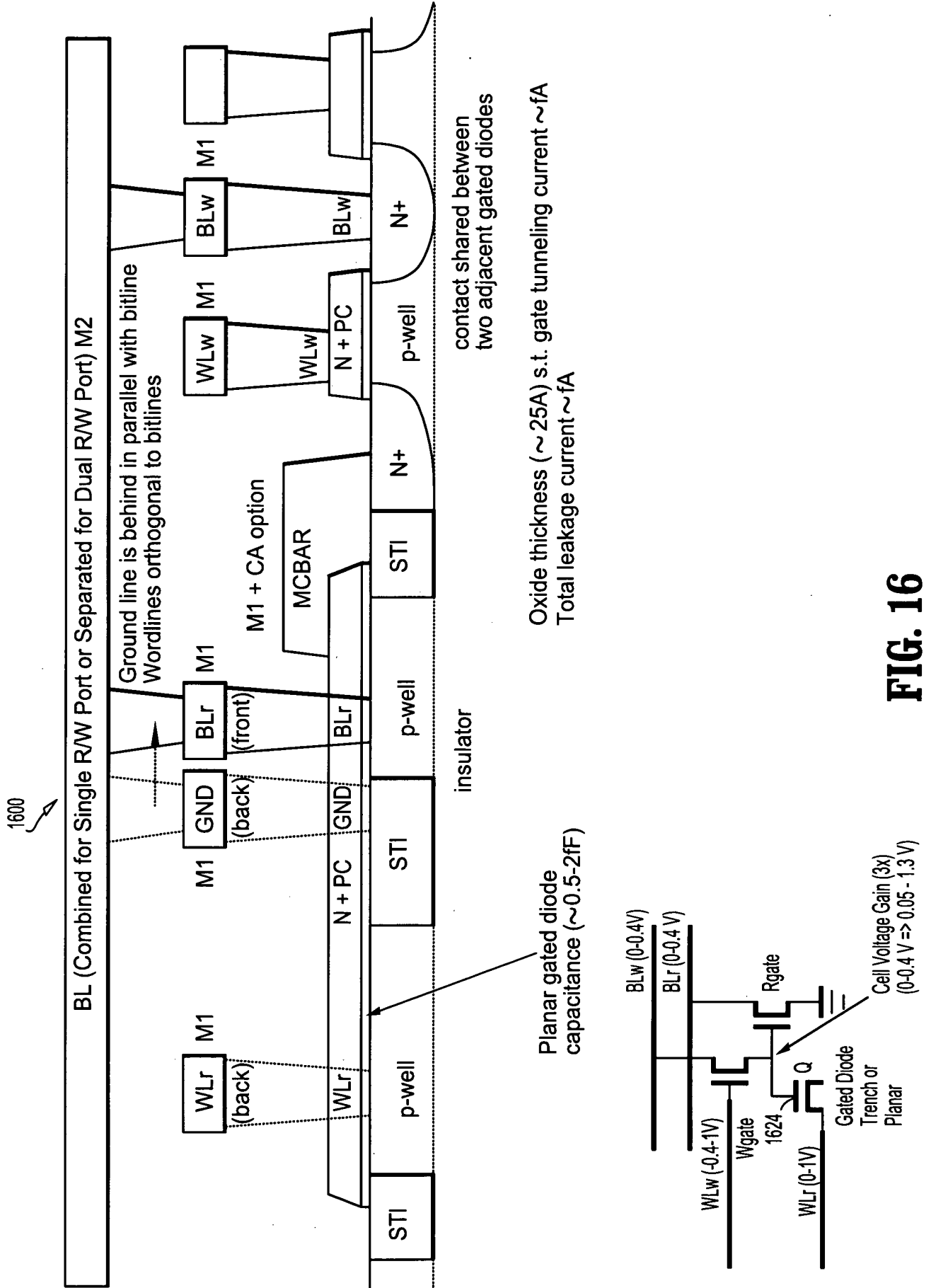


FIG. 16

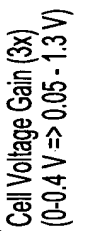
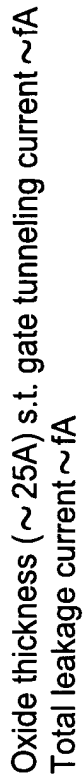


FIG. 17